

No. 666,004.

Patented Jan. 15, 1901.

W. L. R. EMMET.  
INSULATING ELECTRIC CONDUCTOR.

(Application filed Aug. 19, 1899.)

(No Model.)

Fig. 1.

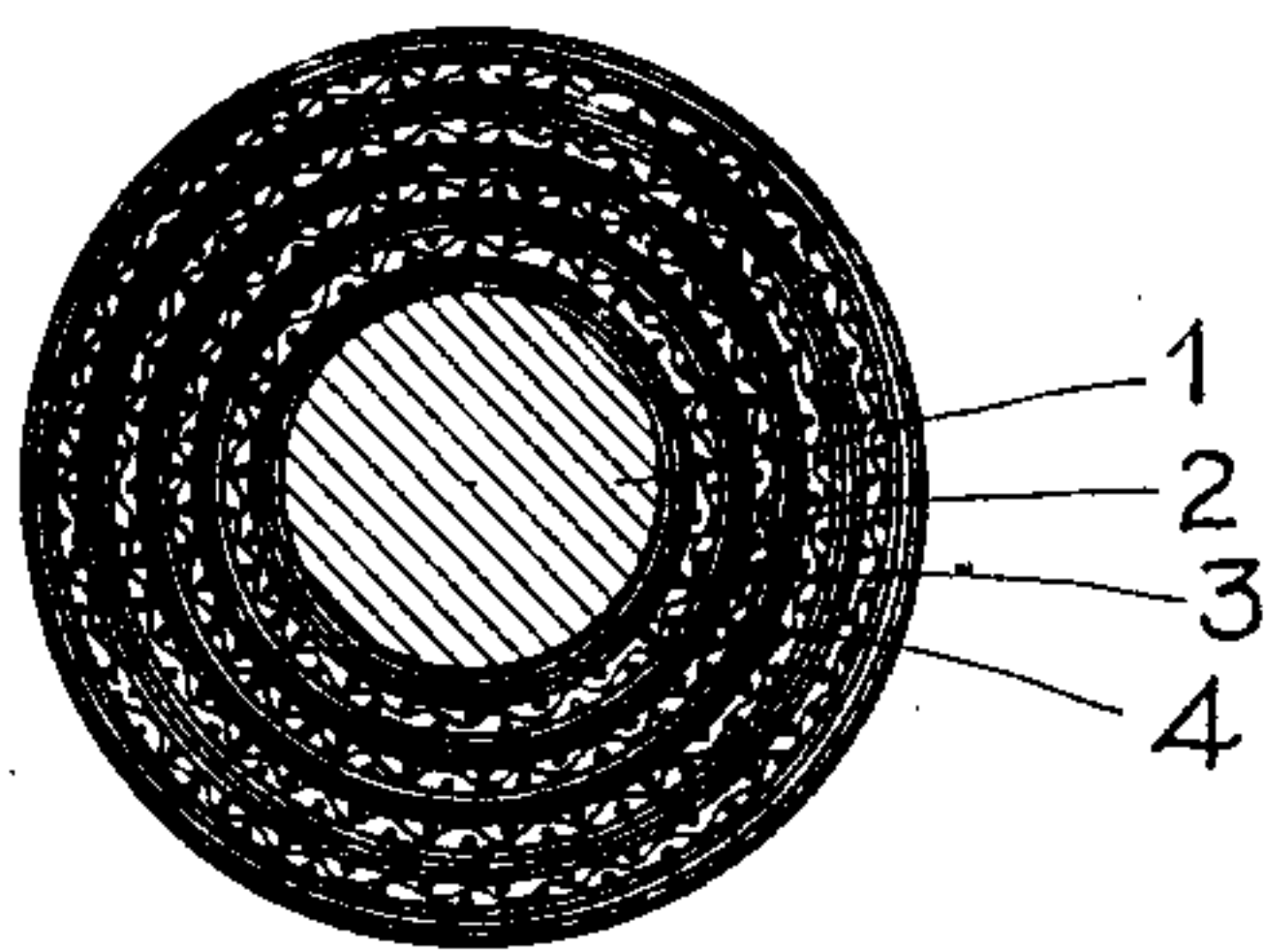


Fig. 2.

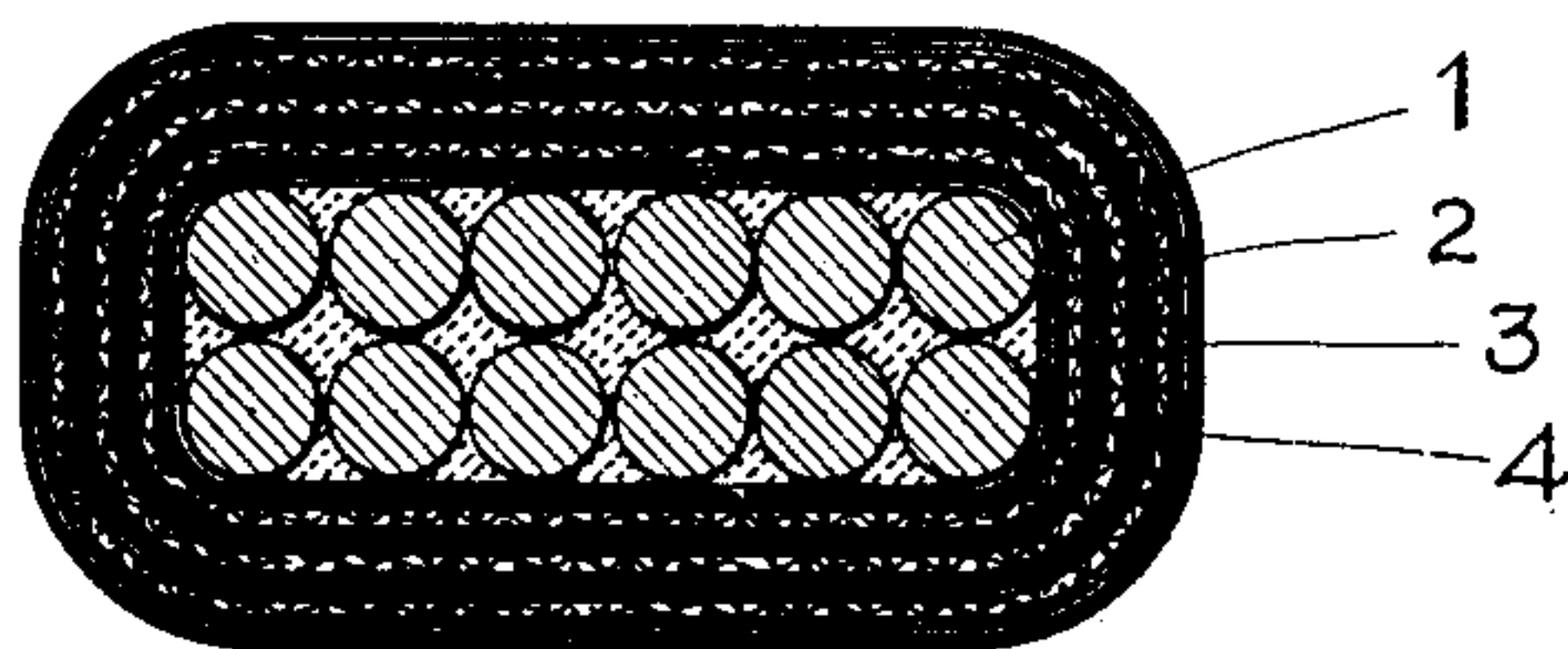
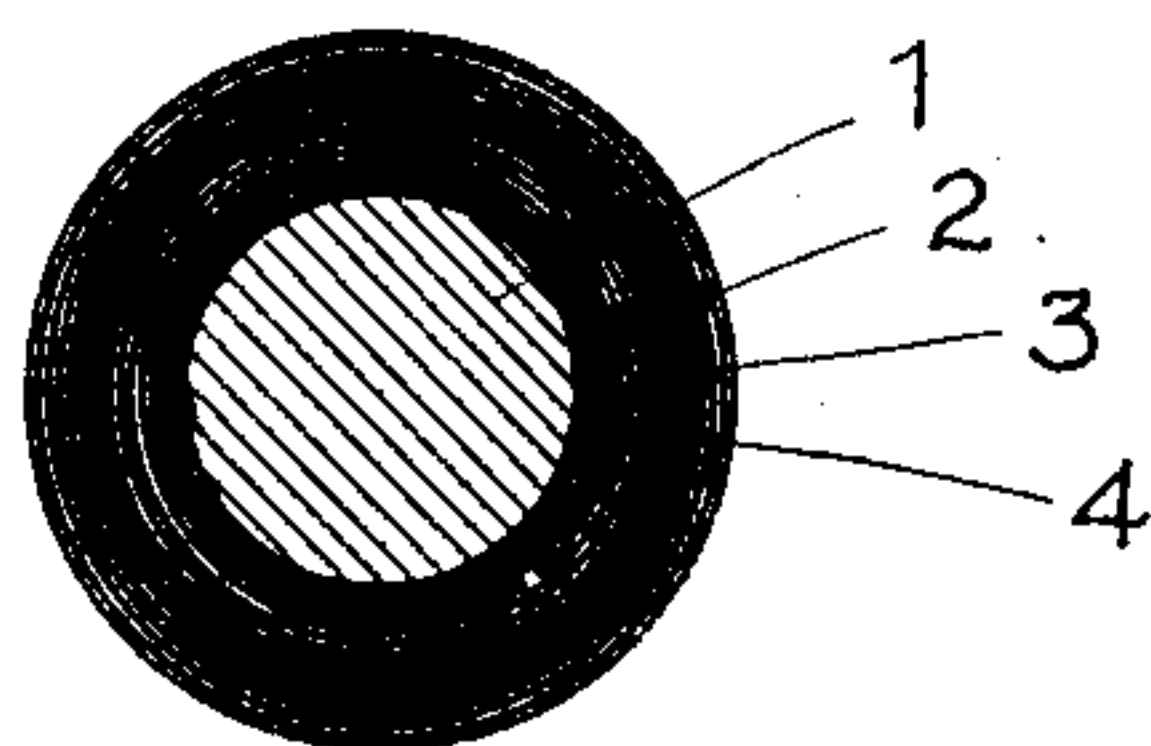


Fig. 3.



Witnesses.

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Atty

# UNITED STATES PATENT OFFICE.

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## INSULATING ELECTRIC CONDUCTOR.

SPECIFICATION forming part of Letters Patent No. 666,004, dated January 15, 1901.

Application filed August 19, 1899. Serial No. 727,743. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM LE ROY EMMET, a citizen of the United States, residing at Schenectady, in the county of Schenectady and State of New York, have invented certain new and useful Improvements in Insulating Electric Conductors, (Case No. 1,370,) of which the following is a specification.

The object of the present invention is to provide an improved insulation for electric conductors or groups of conductors which will render them proof against damage from moisture or moderate degrees of heat.

In carrying out the invention I provide an insulating-covering composed of a plurality of layers or coats of an insulating compound successively applied and permitted to harden before the next succeeding coat is made. The several coats may be applied by dipping or leading the conductor to be treated through a bath of the insulating compound or by applying the compound with a brush or in any other suitable way, so as to produce a series of layers.

My invention is not restricted to the application of any particular insulating compound; but I prefer to employ a compound containing a vegetable oxidizable oil which may be rendered fluid by heat or may be thinned by a solvent. A compound which yields excellent results may be composed of about eighty parts of boiled linseed-oil and twenty parts of rosin. If applied cold, this may be thinned by a solvent, such as benzin, to the desired consistency and applied to the conductor in any suitable way. After coating, the conductor is left until the compound hardens or the solvent evaporates, after which a second coat is similarly applied, and then in order a third or as many coats as may be necessary for the particular use to which the conductor is to be put.

In insulating coils I prefer to cover the coils with a layer of some textile fabric—such, for example, as muslin or other flexible non-conducting material having a tough structure—which will increase its durability and render it proof against abrasion, and then apply the successive coats to the covering. Any number of layers of such a covering may be applied, each provided with an insulating-coat-

ing formed of a plurality of laminæ in the manner hereinafter set forth.

My invention therefore comprises a conductor provided with a plurality of layers of an insulating compound applied in a soft condition and permitted to oxidize and harden *in situ*.

Other features of novelty will be more fully described hereinafter and will be definitely indicated in the claims.

In the accompanying drawings I have exemplified a few of the uses to which my invention may be applied.

Figure 1 shows in magnified section an electric conductor made in accordance with my invention; Fig. 2, a group of conductors representing an armature-coil for an electric motor or dynamo-electric machine, and Fig. 3 shows a modified form of insulation.

The instances herein illustrated of the application of my invention are, however, merely typical, as it may be applied to any case in which a conductor is desired to have high insulating properties and is to be rendered proof against damage by moisture over a long period of service.

As shown in the drawings, 1 represents an electric conductor. A plurality of independent coats or layers of insulating compound, as shown at 2 3 4, are successively applied. The application may be made by carrying the conductor through a bath of insulating compound rendered fluid or sufficiently plastic for working by heat or by a solvent and then given sufficient time to harden or dry out before the next coat is applied. I have attained the best results by employing a mixture of boiled linseed-oil and rosin thinned to the proper consistency with benzin, the linseed-oil and rosin being mixed in about the proportions of four to one.

By applying the coats in the manner specified a closely-coherent protective coating is produced, the several layers becoming intimately associated without definite line of demarcation and effectively protecting the conductor against access of air. The manner of applying the coats also precludes the formation of air-bubbles, and thereby enhances the value of the insulation to a far greater degree than is otherwise possible. The desired



thickness of insulation being built up on the conductor after permitting the inner stratum to harden, a uniform dense tough coherent covering is assured. The exposure of each coat to the air before the next is applied oxidizes the vegetable-oil, giving it toughness and density, and affords a firm foundation for the next layer, which strongly adheres to it without softening it. Sufficient depth of the compound should be applied by the successive coats to at least insure a complete embedding of the fine fibers projecting from strands of the textile material, which if exposed reduce the insulating power of the covered conductor. In insulating the conductor a textile or flexible fabric may be employed as a foundation for the insulating compound, as in Fig. 1, or for some uses the successive coats may be applied directly to the metal, as in Fig. 3. In Fig. 2 an example of an armature-coil to which my invention has been applied is shown. The group of conductors forming the coil may be provided with ordinary insulation and filled in the interstices between the adjacent conductors with an insulating compound, as shown, and then wrapped with a textile fabric, such as muslin, and provided with a series of layers or coats of insulation in the manner specified. This may be conveniently effected by dipping the coil or by painting the compound in successive layers upon the textile covering, sufficient time being allowed between the layers for the film or coat to harden and oxidize. One or more layers of textile fabric thus treated may be applied until a sufficient depth to provide the desired insulation and wearing qualities is attained. A conductor or coil so treated not only stands very high potentials, but does not deteriorate over long periods of service and under severe conditions even under heat. Conductors so treated have been subjected to a temperature of 75° centigrade for six months without material alteration. It does not fuse if the conductor heats, as other compounds commonly employed, and is entirely unaf-

ected from ranges of temperature such as insulated conductors are ordinarily subjected to. The tough dense layer of oxidized oil not only prevents abrasion under strains or by bending by its elasticity, but by reason of its mode of application defies access of moisture to the conductor.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. An insulated electric conductor covered with a plurality of closely-coherent layers of oxidized insulating solution, each layer being coherently connected to the other as described.

2. An insulated electric conductor covered with a plurality of films of an infusible insulating material applied in solution, said films closely cohering each to the other.

3. An insulated electric conductor covered with a plurality of layers of porous fabric, each layer being covered with a plurality of independent closely-coherent films of an infusible insulating compound each layer being a residue of a solution.

4. An insulated electric conductor covered with a plurality of layers of textile fabric, each of which is provided with a plurality of independent coats of closely-coherent infusible insulating compound each layer being a residue of a solution.

5. An insulated electric conductor covered with a plurality of independent layers of oxidized oil, the several layers being closely-coherent residues of a solution.

6. An insulated electric conductor covered with a plurality of layers of textile fabric, each provided with several independent film residues of a solution of hardened oxidized oil closely coherent to one another.

In witness whereof I have hereunto set my hand this 17th day of August, 1899.

WILLIAM L. R. EMMET.

Witnesses:

BENJAMIN B. HULL,  
EDWARD WILLIAMS, Jr.